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SYNOPSES OF NORTH AMERICAN INVERTEBRATES.

XIX. THE TRICHODECTIDÆ.[1]

MAX MORSE.

THE genus Trichodectes, the only genus of the family Trichodectidæ, is one of the two genera of the order Mallophaga which are found on mammals. From the other genus, Gyropus, Trichodectes is distinguished by the fact that its members have a three-jointed antenna. The order Mallophaga has been divided by Piaget ('80) into two families, *viz.*, the family Liotheidæ and the family Philopteridæ — the two being distinguished by the character of the legs which are modified either for running (the former) or for clasping (the latter). Kellogg ('99) has separated the genus Trichodectes from the Philopteridæ by the erection of the family Trichodectidæ which he attributes to Burmeister. His authority for this attribution is not evident. Of the 48 species in the genus, 18 are considered here as having been taken on North American Mammals.

The species of Trichodectes are distinguished from one another by such characters as the size and shape of the antennæ, the character of the setæ, or hairs that clothe the body, the shape of the thorax, the genitalia of both male and female, etc. In the present paper, at the suggestion of Prof. Herbert Osborn, much attention has been paid to the so-called "abdominal appendages" of Piaget. This organ, for it is all one organ, is a growth of the posterior ventral edge of the antepenultimate segment of the abdomen, in the female. The extension grows backward, underlying the major portion of the last abdominal segment and growing upward at the sides to reach the level of the tergum of that segment. The median portion of the extension, however, does not grow very far backward and the result is the formation of two lateral flaps as can be seen in the figures. Dorsally it has the appearance of forming a prominent curved hook at either side. Much variation in this organ in the several species was found and its general shape, together with the presence or absence of setæ on it afford excellent criteria for the separation of species. The function of the abdominal appendage is partly in clinging to the hairs of the host but more especially in the adjustment of the eggs to the hairs.

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[1] Contributions from the Department of Zoölogy and Entomology of the Ohio State University, Number 12.

A word may be said concerning the general habits of these insects. Their food consists of scales and epidermal excretions from the host. The mouth-parts are fitted for biting and the mandibles are well developed. They cling to the hairs of the host by means of the mandibles, which are set at the posterior end of a clypeal groove running longitudinally along the ventral side of the head, into which groove may be fitted a hair and this then grasped by the mandibles. It is probable that the sides of the groove are capable of being closed down over the hair and thus anchor the Mallophagan to the host, without the assistance of the mandibles. The legs, also, assist in holding the insect to the hair. The office of the abdominal appendage has been mentioned. The eggs are often seen in the body of the specimen. There is a well-developed lid fitting over a chitinous capsule. The capsule is glued to a hair and development occurs there, the lid being shoved off at the emergence of the larva. Most of the species are confined to one species of host, although exceptions are met with.

Only those species known to occur in North America are considered here. It is hoped that by the aid of the keys, the figures and the descriptions, any member of the group in the region defined may be identified, even if the host is not known. The characters in the key are given in the main for either sex and none of these characters are difficult of examination. A ready method of preparation is to boil a few minutes in a solution of potassic hydrate in water, clear in carbolic acid and mount in balsam.

No claim to completeness is made for this paper, for it is improbable that it includes all the species to be found on North American mammals. Doubtless there are species imported from Europe that have thus far escaped our notice.

Acknowledgments are due Professor Vernon L. Kellogg, Professor Lawrence Bruner, Dr. L. O. Howard, and Dr. D. E. Salmon, for material. My thanks are especially due Professor Herbert Osborn of the Ohio State University, under whom the work was done and who has offered valuable suggestions in the course of the work. The private collection of Professor Osborn, which embraces nearly all the species considered in this paper was put at the disposal of the writer.

The literature of the group is not large, but I append only the more important papers from the point of view of the worker in North America.

CHAPMAN, BERTHA.
'97. Two new Species of Trichodetes. Ent. News, Vol. 8, pp. 185.
DENNY, H.
'42. Monographia Anopleurorum Britanniæ. London.
GIEBEL, C. G.
'74. Insecta epizoa. Die auf Säugethiere und Vögeln schmarotzenden Insecten. Leipzig.
KELLOGG, V. L.
'99. A List of the Biting-Lice (Mallophaga) taken from Birds and Mammals of North America. Proc. U. S. Natl. Mus., Vol. 22, pp. 39–100.
OSBORN, H.
'91. The Pediculi and Mallophaga Infesting Man and the Lower Animals. U. S. Dept. Agr., Div. Ent., Bull. No. 7.
OSBORN, H.
'96. Insects Affecting Domestic Animals. U. S. Dept. Agr., Div. Ent., Bull. No. 5.
OSBORN, H.
'02. Mallophagan Records and Descriptions. Ohio Nat., Vol. 2. p. 175.
PIAGET, E.
'80. Les Pediculines. Essai Monographique. Leyden.
PIAGET, E.
'85. *Idem.* Supplement.

For further treatment the reader is referred to the works of Osborn and Kellogg as well as those of Piaget that have been cited above.

KEY.

- *a.* Setæ short and delicate, not reaching middle of the succeeding segment. Female abdominal appendage with setæ . . (RUMINANT TYPE.)
  - *b.* Head convex in front.
    - *c.* Head pointed, spines on the anterior border of the female abdominal appendage small and inconspicuous . . . . *scalaris.*
    - *cc.* Head rounded, spines on anterior border of the female abdominal appendage equalling in size those on the posterior.
      - *d.* Form elongated, setæ of antennæ strong and conspicuous.
        - *e.* First tarsal joint of third leg extended; portion of head anterior to antennæ wider than posterior; inner border of female abdominal appendages lobed. *sphærocephalus.*
        - *ee.* Not as above, inner border of female abdominal appendage straight . . . . *parumpilosus.*
      - *dd.* Form short and thick, antennal setæ delicate and inconspicuous.
        - *f.* Abdomen wider than head, thoracic suture evident; ventral border of penultimate segment of the abdomen with deep emargination in the median line. *limbatus.*
        - *ff.* Abdomen width of or less than head, thoracic suture not evident, border very slightly emarginate. *climax.*
  - *bb.* Head emarginate in front.
    - *g.* Distal portion of inner border of tibia of third legs translucent, with setæ short and delicate.
      - *h.* Prothoracic spiracle situated internally, not on lateral edge of the prothorax . . . . *tibialis.*
      - *hh.* Prothoracic spiracle extending laterally beyond edge of segment . . . . *parallelus.*
    - *gg.* Same chitinized and fringed with heavy long setæ . *setosus.*
- *aa.* Setæ long, linear, reaching or extending beyond the middle of the next posterior segment; female abdominal appendage without setæ. (CARNIVORE AND RODENT TYPE.)
  - *i.* Head pointed . . . . *subrostratus.*
  - *ii.* Head not pointed.
    - *j.* Antennæ with proximal joint in the male swollen and having the whole antenna long.
      - *k.* Second antennal joint in the female with posterior process. *geomydis.*
      - *kk.* Second antennal joint in female without process.
        - *l.* Prothorax long, twice the length of the meso-metathorax.

m. Anterior border of the head converging to a point. *californicus.*

mm. Anterior border of the head convex-rounding. *castoris.*

ll. Prothorax short, equalling in length the posterior part.

n. Length under one mm. . . . . . . *mephitidis.*

nn. Length over one mm. . . . . . . *thoracicus.*

jj. Antennæ linear, the proximal joint not swollen.

o. A series of long, strong spines on the posterior border of the metathorax. . . . . *nasuatis.*

oo. Spines limited to the lateral portions of the posterior border of the metathorax.

p. Præocular sinus in the male wide, the præantennal spur being widely separated from the eye.

q. Length over 1.50 mm. . . . . *latus.*

qq. Length under 1.50 mm. . . . . *retusus.*

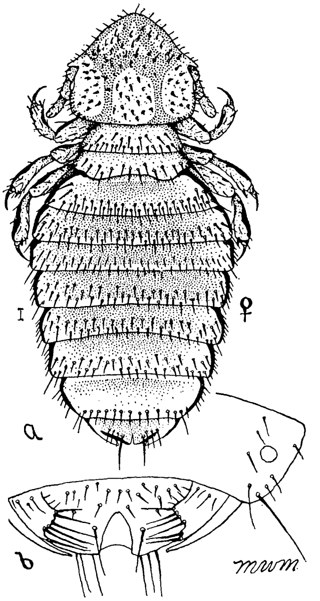
pp. Sinus narrow, the eye being close to the præantennal spur . . . . *quadraticeps.*

Descriptions.

Family **Trichodectidæ.** Kellogg.

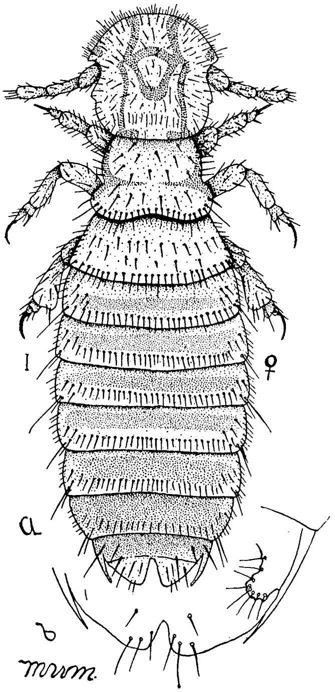
Genus Trichodectes. Nitzsch.

T. scalaris Nitzsch. Female: Length, 1.368 mm.; width of abdomen, .666 mm.; head, .342 mm.; thorax, .180 mm.; antennæ, .154 mm. Outline of body elliptical. Head not as broad as abdomen, roughly triangular in outline, front converging to a bluntly-pointed anterior margin. Antennæ linear and small. Thorax trapezoidal. Pro-mesothoracic suture distinct. Meso-metathorax with lateral borders salient and prominent, with strong setæ; posterior border of thorax sinuous. Abdomen widest on segment 3. Lateral borders of segments dark, heavily covered with setæ. Segments 1–8 with transverse, fuscous bands. Setæ strong, but short and blunt. Head covered with setæ as is also the case with the abdomen. No male specimen available. On domestic cattle.



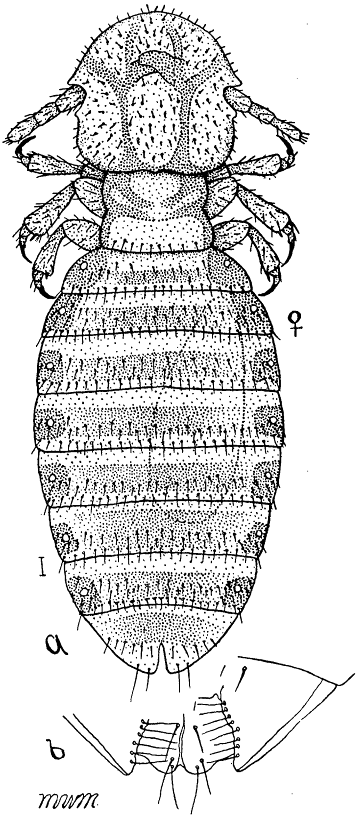
T. scalaris, *a*, female; *b*, abdominal appendage of female.

T. sphærocephalus Nitzsch. Female: Length, 1.764 mm.; width, .63.; head, .396; thorax, .27; Antenna, 27. Body elongated, narrow. Head not as broad as abdomen, squarish, semicircular in outline in front of the antennæ. Prothorax not well marked off from rest of thorax and narrower than meso-metathorax. Posterior border of metathorax concave. Abdomen elliptical, widest on segments 3 and 4. Middle of segments with smoky brown bands running transversely. First tarsal joints of second and third legs with inner border extended and swollen and surrounded with setæ. Setæ in general, abundant. Antennæ and front of head thickly covered with setæ. Basal joint of antenna larger than other two joints, distal segment clavate. Tarsal claws long and strong. Male not in hand. On domestic sheep.



T. sphærocephalus. *a*, adult female; *b*, abdominal appendage of female.

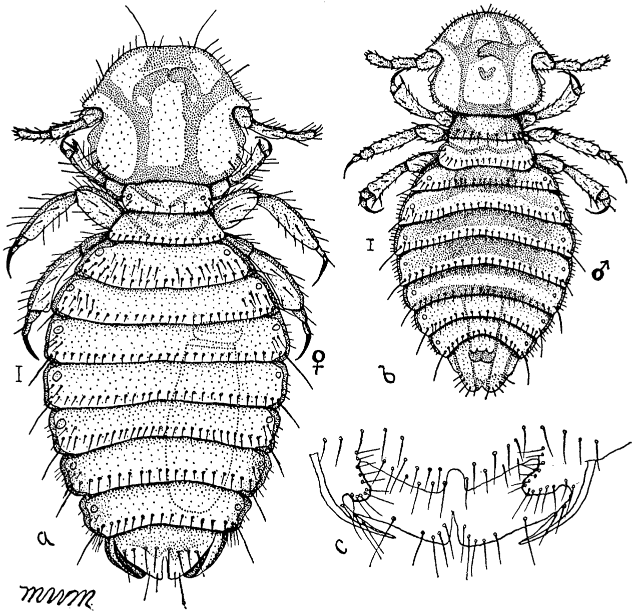
T. parumpilosus Piaget. Length, 2.127 mm.; width, .81; head, .504; thorax, .306; antenna, .27. Form large. Head convex in front, slightly longer than wide, about two thirds as wide as the abdomen. Antennæ stout, linear, proximal joint but little larger than others. Mandibles small. Thorax with the suture indistinct, the two segments being of about equal width. Posterior border convex. Lateral borders of the two portions of the thorax parallel. Abdomen with stigmata surrounded by dark blotches.



T. parumpilosus. *a*, adult female; *b*, abdominal appendage of female.

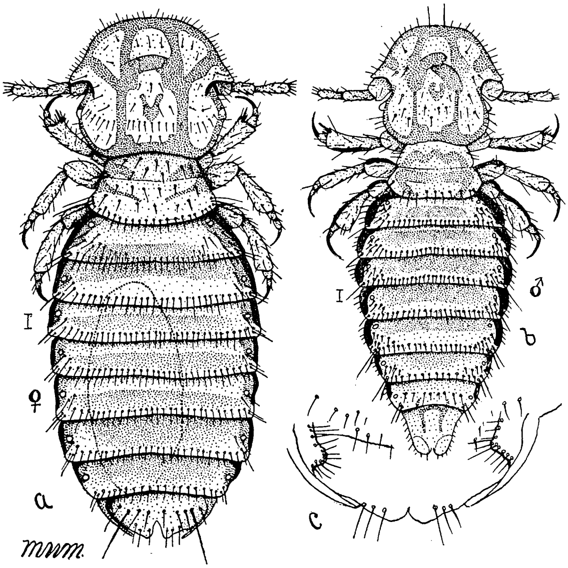
Interior of segments transversely banded. Setæ delicate, short and inconspicuous. Tarsal claws slender. Male not in hand. Found on the horse. This is a synonym of *equi* Denny.

T. limbatus Gervais. Female: Length, 1.71 mm.; width, .828; head, .45; thorax, .22; antenna, 27. Body large, elliptical in outline. Head square, with anterior portion trapezoidal, the anterior border being truncate. Preantennal spur well-developed. Eyes prominent. Antennæ linear. Thorax short, narrow, with antero-lateral angles produced. Abdomen widest on segments 3 and 4, the outline ovate. Lateral borders of the segments dark and heavily chitinized. Tarsus normal, claws strong, slightly curved. Setæ scant and delicate. Male; Length, 1.206 mm.; width, .54; head, .324; thorax, 198; antenna, .234. Smaller than the female, but general shape the same, except that the abdomen converges more abruptly posteriorly from the 3 and 4 segments. Setæ as in the female. From the Common Goat and the Angora Goat.

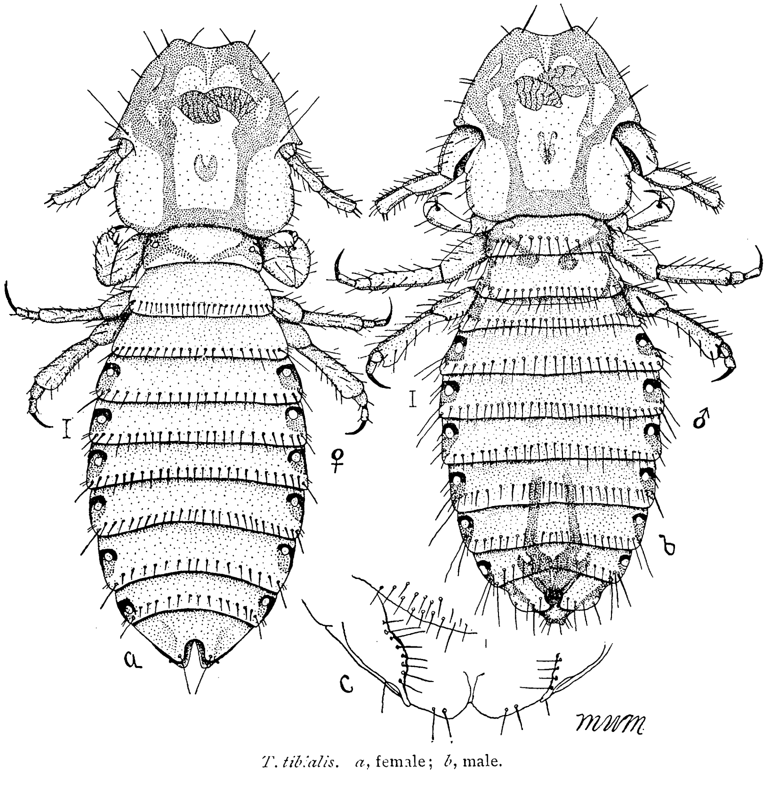


T. limbatus. *a*, adult female; *b*, adult male; *c*, abdominal appendage of female.

T. climax Nitzsch. Female: Length, 1.693 mm.; width, .702; head, .45; thorax, .198; antenna, .27. Outline of the body elongated-elliptical. Head square, about three fourths as wide as abdomen. Anterior border only slightly convex, the portion in front of the antennæ being in outline a semicircle. Antennal pit deep, the angle well defined. Antennæ linear, distal segment slightly swollen in the middle. Thorax trapezoidal, the suture not



T. climax. *a*, female; *b*, male; *c*, abdominal appendage of female.

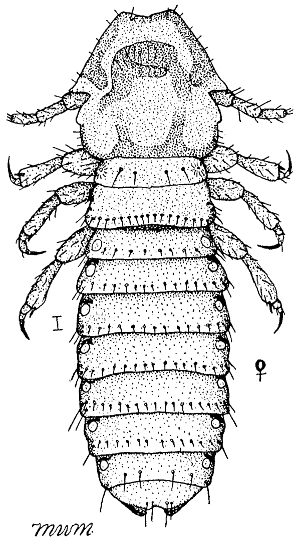


T. tibialis. *a*, female; *b*, male.

very distinct. Posterior border convex. Abdomen widest on segments 3 and 4. Lateral borders of the segments dark. Middle of the segments transversely banded. Setæ delicate but profuse. Tarsal claws long and strong. Male: Length, 1.35 mm.; width, .702; head, .378; thorax, .18; antennæ, .27. Head as in the female. Thorax longer in proportion than in the female, but similar in outline. Posterior border slightly concave. Abdomen widest on segments 2 and 3, whence the body outline curves rapidly to the end of the abdomen. Lateral borders of the segments dark and middle of the segments banded transversely. Tarsal claws longer and less curved than in the female. On the Domestic Goat.

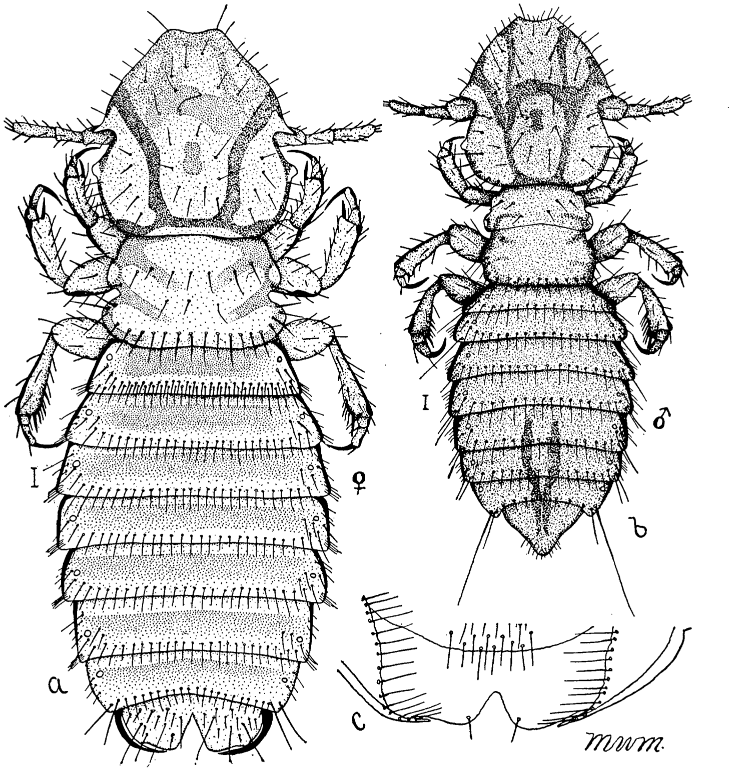
T. tibialis Piaget. Female: Length, 2.016 mm.; width, .756; head, .595; thorax, .288; antenna, 360. Head about as wide as the abdomen, elongated, eyes prominent, preantennal spur obtuse. Mandibles long and strong. Antennæ with distal joint swollen. Thorax narrower than head, margin continuous with the contour of the abdomen. Prothoracic spiracle distinct. Suture fairly evident. Posterior border convex. Abdomen elliptical, with dark blotches in front of the spiracles. Segments with transverse bands. Setæ short and thick, in single transverse rows on the abdomen. Tarsal claws moderately strong. Male; Length, 1.89 mm.; width, .702; head, .612; thorax, .270; antenna, .450. Head as wide as the abdomen. Shape as in the female. Proximal segment of the antenna enlarged. Length of the antenna in the male greater than in the female. Trabeculæ in the head conspicuous. Thorax as in the female, but the lateral angle more extended. Abdomen elongate, with segments transversely banded. Spiracles with blotches as in the female. On the Black-tailed Deer.

Trichodectes parallelus Osborn. Female: Length, 1.56 mm.; width, .45; head, .45; thorax, .21; antenna, .28. Body elongated, abdomen narrow Leipurus-like, the ratio of the length to the width being about 3.1. Widths of the head and abdomen nearly equal. Head with sides in front of the antennæ converging forward. Anterior border of head emarginate. Head heavily chitinized. Joints of antennæ of equal diameter, linear. Thorax square, the suture not distinct. Prothoracic spiracles prominent. Abdomen with sides parallel, beginning to converge towards posterior end at the penultimate segment. Setæ short and delicate, sparse and thinly distributed. Spiracles of the abdomen capped anteriorly with black blotches. Tarsal claws long. Male not known. On a species of deer, the species not being known to the describer.



T. parallelus. Female.

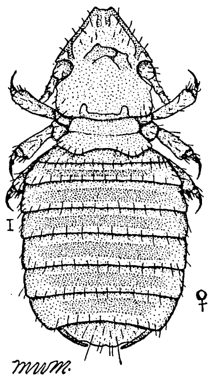
Trichodectes setosus Giebel. Female: Length, 2.304 mm.; width, .846; head, .594; thorax, .396; antenna, .324. Large, elongated. Width of the head and that of the abdomen nearly equal, the latter slightly the greater. Head large, sides in front of the antennæ converging to the slightly concave front border. Antennæ filiform. Thorax large, prothoracic spiracle very prominent. Suture evident. Posterior border slightly concave. Abdomen with the lateral border of the segments chitinized and dark. Middle of the segments pigmented. Abdomen widest on segments 4 and 5. Setæ short and delicate, well distributed. Tarsal claws long and strong. Male: Length, 1.692; width, .576; head, .486; thorax, .27; antenna, .27. Head more elongated than in the female. General characters as in the female, save that the abdomen is shorter, narrower, widest on segments 3 and 4. Thorax longer, posterior border convex. Proximal joint of the antennæ large. Abdomen terminated in a point. Pro-mesothoracic suture more distinct than in female. On the porcupine, *Erethizon ermineus*, Neb.



T. setosus. *a*, female; *b*, male; *c*, abdominal appendage of the female.

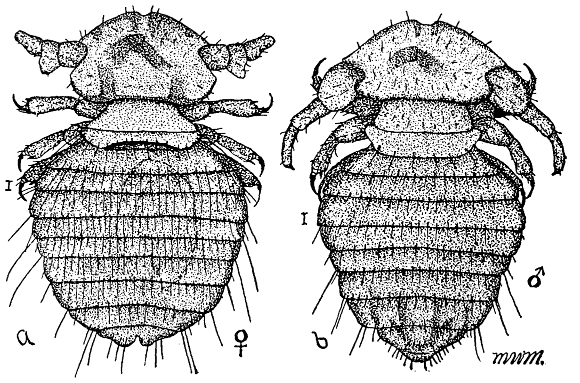
Trichodectes subrostratus Nitzsch. Female: Length, 1.116 mm.; width,

.54; head, .36; thorax, .09; antenna, .114. Head acutely pointed anteriorly. Antenna slender. Thorax short. Suture between prothorax and mesothorax distinct. Posterior border of thorax concave. Abdomen elliptical, obtuse and broad, broadly rounded posteriorly. Segments banded transversely. Setæ inconspicuous. Male not in collection. On the domestic cat.



T. subrostratus. Female.

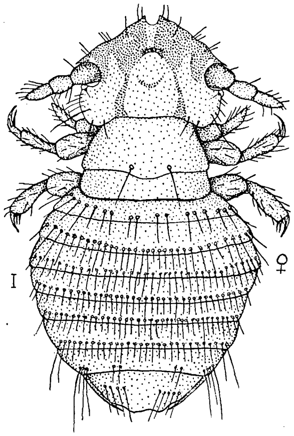
Trichodectes geomydis Osborn. Female: Length, 1.134; width, .66; head, .306; thorax, .162; antenna, .234. Head broader than long. Antennæ thick and short, heavily chitinized, with second joint provided with a posterior extension. Prothorax narrower than meso-metathorax, the latter with lateral borders extended. Posterior border of the thorax concave. Abdomen broad, widest on segments 3 and 4, whence the sides of the abdomen converge gently posteriorly. Setæ delicate and long. Male: Length, 1.08 mm.; width, .63; head, .23; thorax, .114; antenna, .396. Similar to female, but the sides of the abdomen converging posteriorly more abruptly than in the female. Antennæ longer and proximal joint swollen. On the Rodent, *Geomys bursarius*, (Ames, Ia.) and *Thomomys bottæ* (California).



T. geomydis. *a*, female; *b*, male.

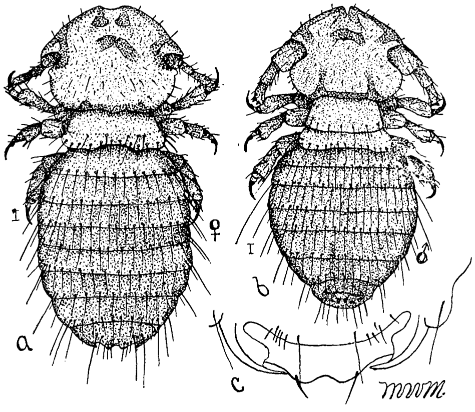
Trichodectes californicus Chapman. Female: Length, 1.37 mm.; width, .84; head, .33; thorax, etc., not given. Form "short, broad, pale yellowish white without definite markings, except on the front of the head." "Head" with "anterior margin with a deep incision; sides of the front receding rapidly to the sharply angulated trabeculæ; . . . . antennæ long and large, reaching beyond the temporal margin when extended back; . . . eye prominent; . . . . occipital margin nearly straight and without hairs or spines; . . . .

prothorax long and wide; sides slightly rounding; posterior margin medially convex; .... abdomen broadly oval, reaching its greatest width at the third segment; ...." Chapman ('97). Male not known. From a pocket-mouse, *Perognathus*, *sp.*



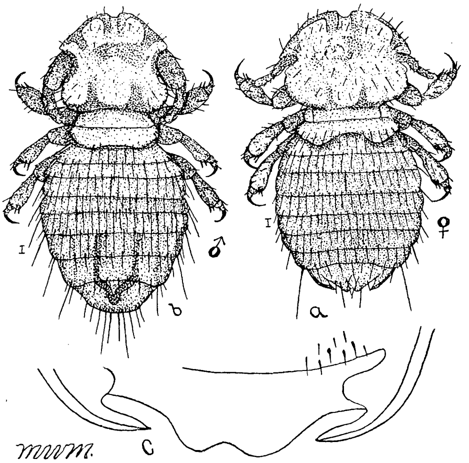
T. californicus. Female. From Chapman, *Ent. News*, ('97).

Trichodectes castoris Osborn. Female: Length 1.20; width, .52; head, .32; thorax, .16; antenna, .19. Head broader than long. Antennæ slender, basal joint not swollen. Thorax not showing the suture distinctly. Thorax short, posterior border concave. Abdomen elliptical, widest on segments 4 and 5. Sides straight. Setæ long and delicate on the posterior lateral borders of the segments, shorter on the middle of posterior border. Tarsal claws short and delicate. Male: Length, .99; width .48; head, .21; thorax, .126; abdomen, .252. General shape as in the female. Antennæ longer, with proximal segments swollen. Suture in the thorax more distinct. Abdomen broadest on the third segment, whence the sides converge posteriorly. Setæ on the abdomen long. Genital hooks well developed, lying parallel with one another, but slightly curved. From the Beaver.



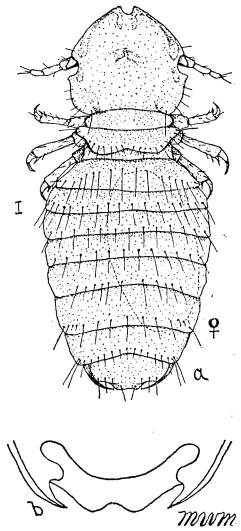
T. castoris. *a,* female; *b,* male; *c,* abdominal appendage of female.

Trichodectes mephitidis Osborn. Female: Length, .90 mm.; width, .50; head, .30; thorax, .12; antenna, 18. Form short and thick. Head broader than long and as wide as abdomen. Antennæ thick, segments equal in diameter. Thorax short and wide, prothorax narrower than remainder of thorax. Metathorax with antero-lateral angles extended. Abdomen thick and broad, widest on 4. Setæ long and delicate. Tarsal claws of medium size. Male: Length, .90 mm.; width, .46; head, .27; thorax, .18; antenna, .19. Shape as in the female except that the front of the head is more acute. Antennæ longer than in female, with proximal joint swollen. Thorax longer, narrower than in female. Abdomen widest on segments 3 and 4. Setæ long and delicate as in the female. On the Skunk, *Mephitis mephitica*, Ia. and Neb.



T. mephitidis. *a*, female; *b*, male; *c*, abdominal appendage of female.

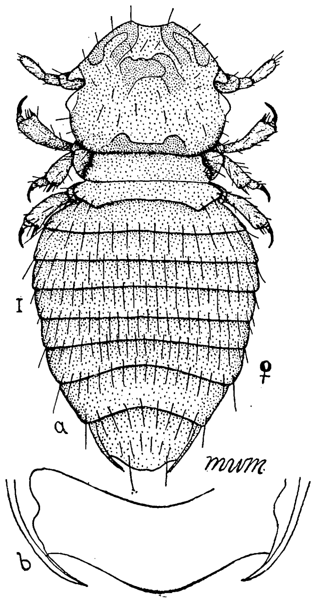
Trichodectes thoracicus Osborn. Female: length, 1.183 mm.; width, .576; head, .324; thorax, .144; antenna, .180. Head broad. Antennæ filiform. Thorax with two parts well distinguished by suture. Lateral border of meso-metathorax widely extending. Posterior border of thorax concave. Abdomen ovate, widest at segments 2 and 3, converging very gently towards the posterior end of the abdomen. Setæ slender and long. Abdominal appendage with flaps provided with extensions toward median line of the abdomen. Male: Length, 1.15 mm.; width, .58; head, .32; thorax, .18; antenna, .21. Head more elongated than in the female. Thorax and abdomen as in the female, save that the abdomen converges more abruptly posteriorly. Proximal joints of the antennæ enlarged. On *Bassaris astuta*, Palo Alto, California.



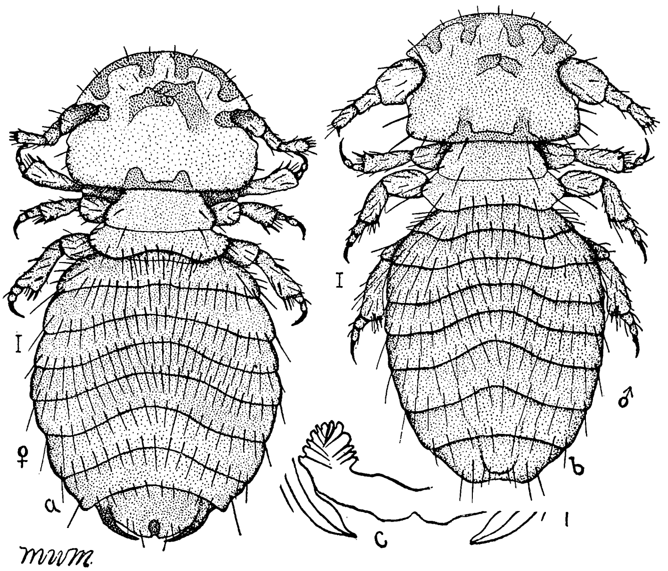
T. thoracicus. *a*, female; *b*, abdominal appendage of female.

Trichodectes nasuatis Osborn. Female: Length, 1.44 mm.; width, .792; head, .432; thorax, .180; antenna, .234. Head broad, narrower than the abdomen. Antennæ slender, proximal segment slightly enlarged. Thorax short, posterior border concave. Abdomen wide anteriorly, converging from segment 3 to the posterior end. Setæ long and delicate. Tarsal claws long and slender. From Nasua, Costa Rica.

Trichodectes latus Nitzsch. Female: Length, 1.890 mm.; width, 1.116; head, .414; Thorax, .27; antenna, .2888. Head wider than long, front margin flattened-convex, arching forwards but slightly from the antennæ. Eyes prominent. Posterior border of the head as well as the postero-lateral border provided with six long setæ on either side. Antennæ of moderate thickness and length, terminated by a tuft of delicate setæ. Antennal sulcus moderately wide. Prothorax well differentiated from the remainder of the thorax by the suture. Prothorax the length of the meso-metathorax, sides diverging from the attachment with the head, posteriorly, to meet the expanded antero-lateral knob-like expansion of the meso-metathorax. Posterior margin of the thorax emarginate on the abdomen. The abdomen wider than the head, without transverse bands on the segments. Setæ in general long and delicate. Genetalia the type of *Retusus*, but the delicate inner border

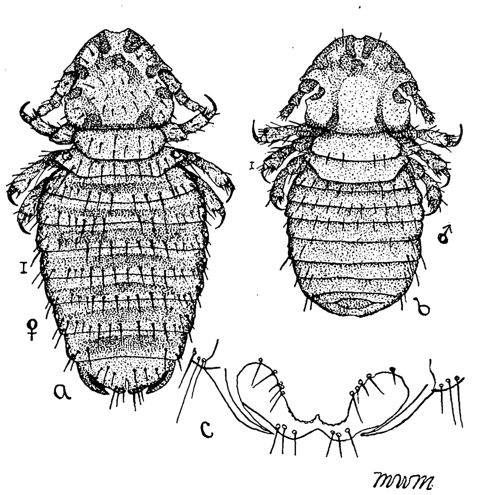


T. nasuatis. *a*, female; *b*, abdominal appendage of female.



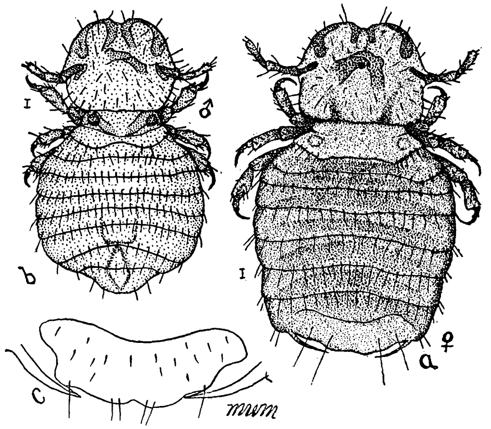
T. latus. *a*, female; *b*, male; *c*, female abdominal appendage.

wider and sinuous. The strong spines of the forward portion of the genitalia point in a postero-median direction as well as outwardly as in *Retusus.* Male: Length, 1.638 mm.; width, .810; head, .414; thorax, .27; antenna, 36. Antennal sulcus very wide. Eyes less prominent than in the female. Antennæ with the basal joints swollen. Abdomen pointed posteriorly. Genital hooks situated close to the median line, but slightly curved. On the Domestic Dog.



T. retusus. *a*, female; *b*, male; *c*, abdominal appendage of female.

Trichodectes retusus Nitzsch. Female: length, 1.206 mm.; width, .576; head, .324; thorax, .162; antenna, .162. Small, head narrower than the abdomen. Sides of head, in front of antennæ, converging anteriorly, the contour of the clypeus being a semicircle. Trabeculæ prominent. Eyes inconspicuous. Antennæ chitinized, strong. Distal segment of the antenna clavate and provided with a wart-like inner extension. Thorax with suture definite. Mesothorax with lateral angles widely expanded provided with strong setæ. Hind border of thorax concave. Abdomen widest on the second segment, whence the borders converge gently to the end of the abdomen. Setæ long and delicate, well distributed. Tarsal claw short and delicate. Tibia with distal angles expanded. Male: Length, .828 mm.; width, .450; head, .288; thorax, 144; antenna, 180. General shape as in the female. Abdomen shorter, rounded posteriorly; generative organs inconspicuous.



T. quadraticeps. *a*, female; *b*, male; *c*, abdominal appendage of female.

Setæ delicate. Tibia with distal edges expanded as in the female. Tarsal joints small. On the Weasel *Putorius ermineus.*

Trichodectes quadraticeps Chapman. Female: Length, 1.08 mm.; width, .63; head, .324; thorax, .114; antennæ, .18. Head quadrangular, widest along the posterior border. Antennæ slender and long. Thorax short, with metathoracic segment extending laterally. Spiracles prominent. Abdomen wide, much wider than head. Widest portion of the abdomen on the fourth segment. Posterior part of abdomen squarish, the sides but little converging. Generative appendages long and prominent. Male: Length, .918 mm.; width, .54; head, .27; thorax, .126; antenna, .114. General shape as in the female. Abdomen wider in proportion than in the female. Setæ short, delicate and sparse. Tarsal claws long, straight and narrow. On the fox, *Urocyon virginianus.*